

MEEIC Interaction Region Design Status

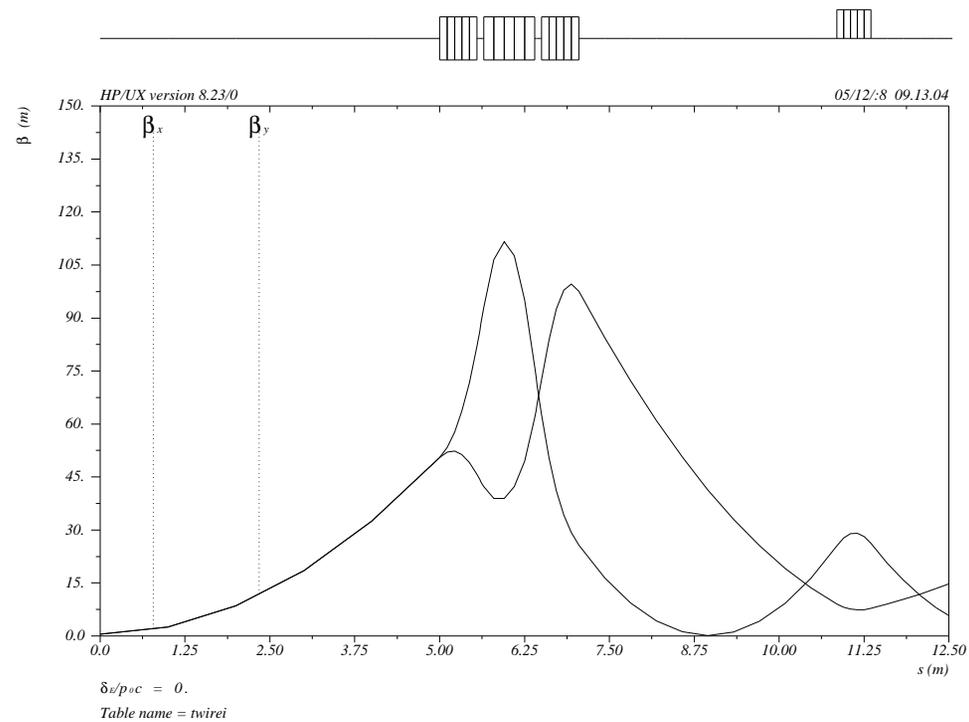
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Challenges

- Low- β focussing to $\beta^* = 0.5$ m
- Beam separation: need 65 cm separation at upstream DX dipole (9.8 m from IP)
- Sharp 180° bend downstream of detector
- Accomodation of synchrotron radiation fan (geometry, background issues)

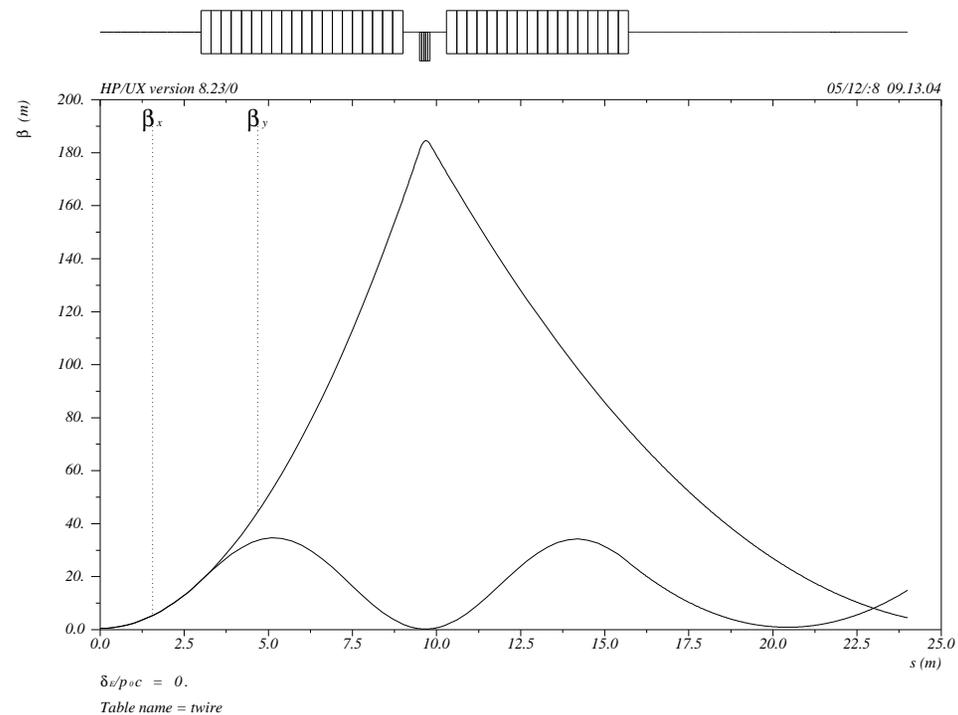
Electron Beam Focussing

Incoming beam:



Triplet at $l^* = 5$ m (uncritical)

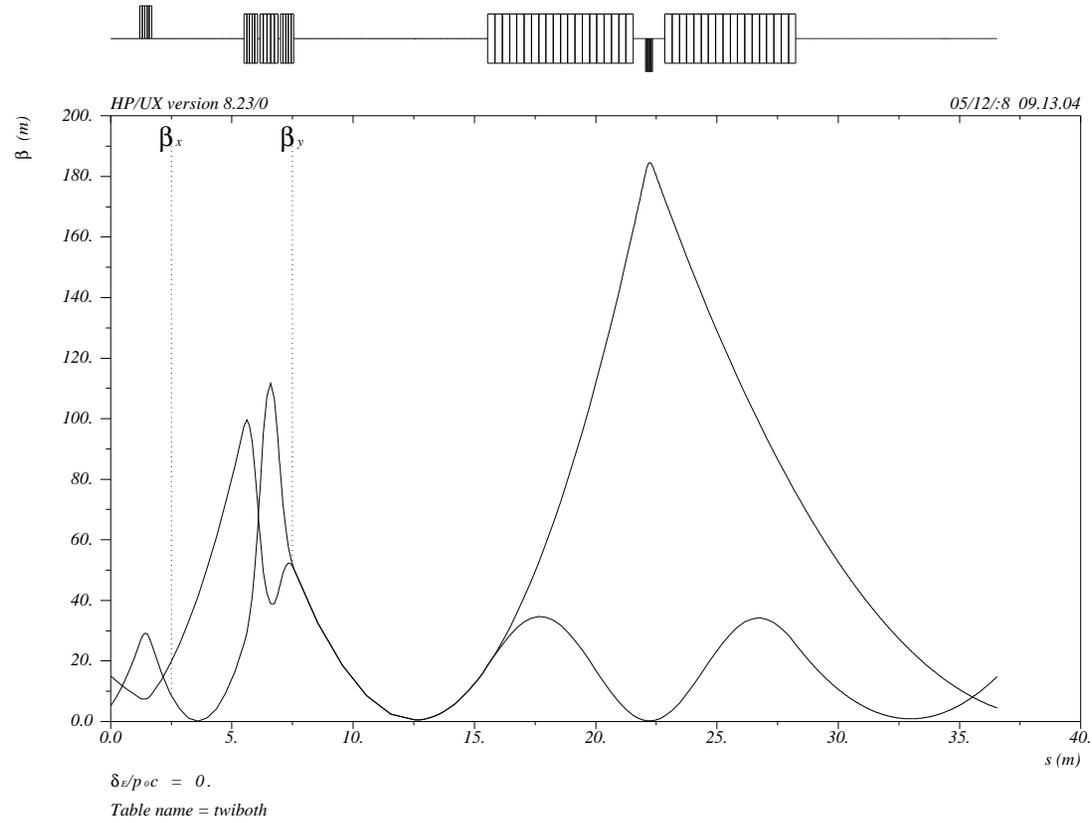
Outgoing beam:



180° bend starting at $l^* = 3$ m

Initial separation by (weak) detector-integrated dipole

Entire IR:

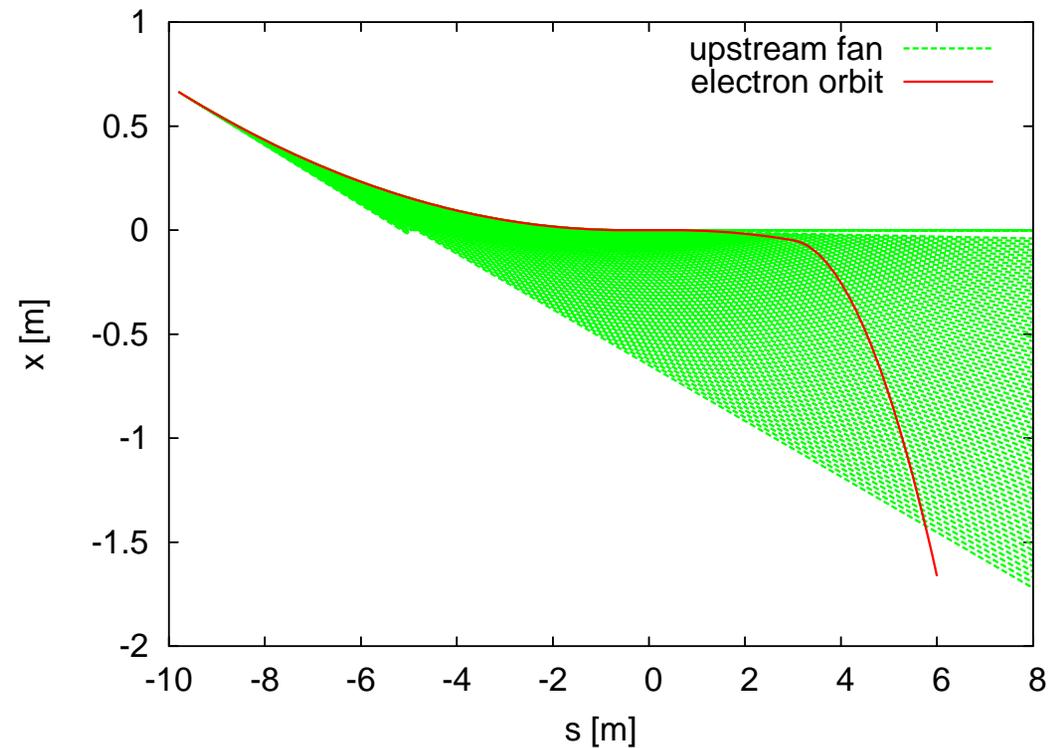


SR Fan Accomodation

Upstream of detector:

- Required large separation produces a very wide synchrotron radiation fan
- Choice between soft, wide fan or hard, narrow fan

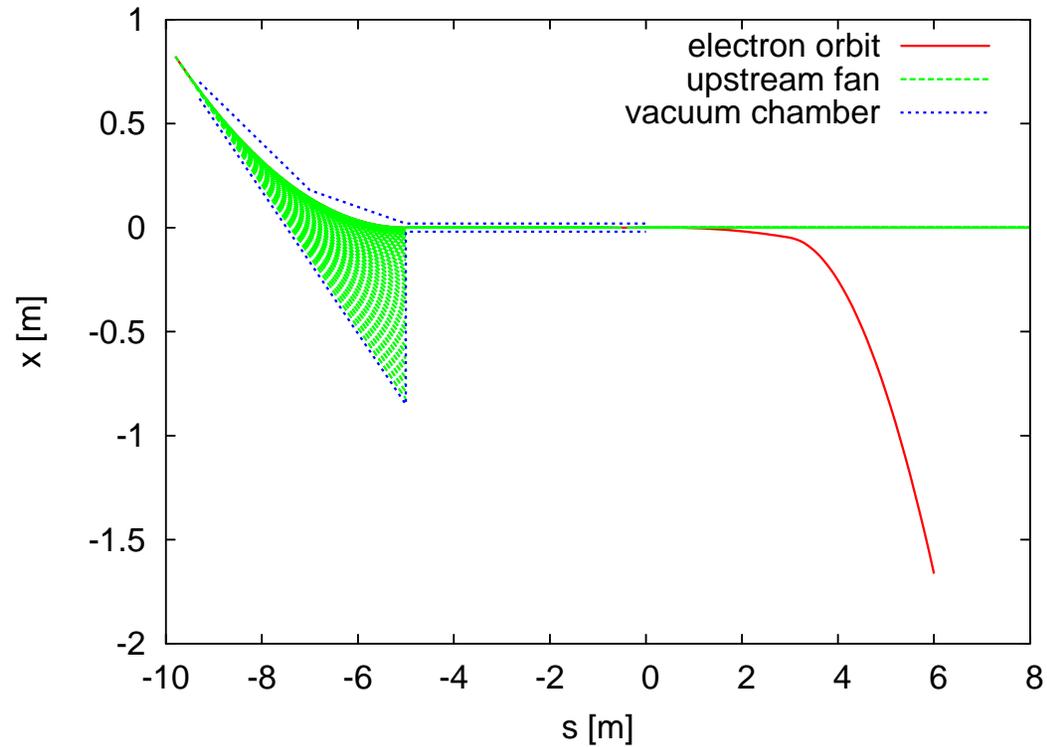
Fan geometry with soft, long bend on incoming side:



0.4 kW at 2.2 keV critical photon energy

Are these soft X-ray photons allowed to hit the detector
beampipe?

Fan geometry with hard, short bend near DX on incoming side:



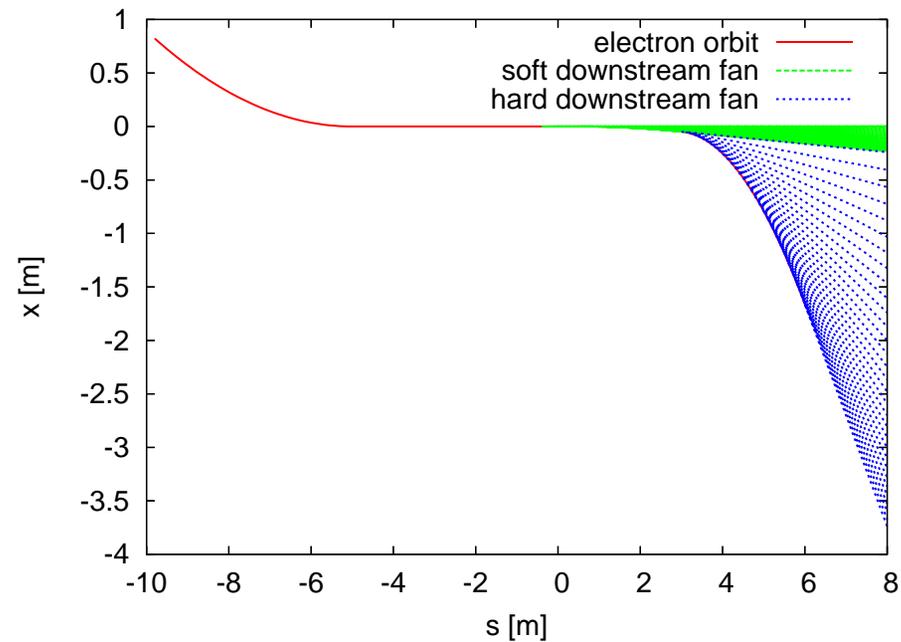
4 kW at 10.1 keV critical photon energy
Largely absorbed upstream of detector
(Permanent magnet) quad triplet inside detector?

SR Fan Accomodation (cont.)

Downstream of detector:

- 180° bend produces very hard photons (tens of kW with $E_c \approx 50$ keV)
- Photon backscattering is a huge problem
- Hard photons must not hit any surface close to the detector
- Soft initial bend (DID), since some surface hits cannot be avoided. Still hundreds of Watts at $E_c = 2 \dots 3$ keV

Fan geometry on outgoing side:



soft initial bend from detector-integrated dipole

hard 180° bend

SR background needs to be studied

Detector “blind-spot” in horizontal plane helps, but can we build a wide, thin detector pipe that doesn’t collapse?

Summary

- Electron beam focussing to $\beta^* = 0.5$ m is rather straightforward.
- Accomodation and absorption of synchrotron radiation fan from upstream separation seems feasible.
- Hard x-rays from 180° downstream dipole are a huge concern. Need detailed studies to minimize background from back-scattered photons.